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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
SEDIGHIAN, REZA	

ART UNIT	PAPER NUMBER
2633	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/309,768	SHIMOMURA ET AL.	
	Examiner	Art Unit	
	M. R. Sedighian	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 April 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6-8 and 11-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-8 and 11-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

1. This communication is responsive to applicant's 4/7/03 amendments in the application of Shimomura et al. for "Optical Switch and Optical Network" filed 5/11/99. The amendments have been entered. Claims 1-4, 6-8, 11-41 are now pending.

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 21-22, 28-31 and 34-41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to claim 21, it is not clear what is meant by "... a plurality of second optical amplifiers coupled to said second optical couplers ...". Figure 14 shows gate optical amplifiers 161-164 that each has a first and a second optical amplifier according to any one of the first to seventh embodiments. Figure 1 shows the second optical amplifier 12 is connected to a third optical coupler 53 at the input side, and to a fourth coupler 54 at the output side. Therefore, the second optical amplifiers in each optical gates 161 to 164 are not coupled to second optical couplers. In another word, the second optical amplifiers are coupled to the first optical amplifiers through optical couplers. Furthermore, it is not clear about " ... at least one first optical wavelength multiplexer whose input is connected to each of the output-side branches of some of said plurality of second optical couplers". Figure 14 shows a first optical multiplexer 304 whose input is connected to the output of the second optical amplifiers (not through the second optical couplers, which are located between the first and second amplifiers).

As to claim 29, it is not clear about a third optical coupler that is inserted between the first and second optical amplifiers?? Which coupler is the third coupler that is inserted between the first and second amplifiers??

As to claim 30, it is not clear about a third optical coupler having an input-side first branch connected to an output of the first optical amplifier and an output-side branch connected to an input of the second optical amplifier. Which coupler is the third coupler with an input-side and an output-side branch??

As to claims 34-35, it is not clear about the second optical signal that is inputted from an input optical transmission line upstream of the second optical amplifier. Which optical transmission line is upstream of the second amplifier?? Which optical transmission line is the second optical transmission line?? Which optical coupler is the second optical coupler that can provide an add-drop mode??

As to claims 36 and 39, it is not clear about the inputting of a second optical signal to both the first and the second erbium-doped fibers from the first and second pumping sources. Furthermore, it is not clear about inputting a second and a third optical signal to the second erbium-doped fiber. Figure 1 shows a second pump 32 that inputs a second optical signal into the second erbium-doped fiber 12. Which signal is the second optical signal that is inputted to the first erbium-doped fiber?? Which signal is the second optical signal that is inputted to the second erbium-doped fiber?? Which signal is the third optical signal that is inputted to the second erbium-doped fiber??

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-3, 6, 16, 18, 23, 25-26, 32, and 36-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugaya (US patent No: 5,812,710)

Regarding claim 1, Sugaya discloses an optical switch (fig. 23) comprising: a first optical amplifier (123, fig. 23) which includes a first erbium doped fiber (col. 18, lines 16-20), and a first optical pumping source (126, fig. 23) with a first optical branch (the coupler that connected to fiber 123); a second optical amplifier (121, fig. 23) that is connected in cascade to the first amplifier (123, fig. 23), and which includes a second erbium doped fiber (col. 18, lines 16-20), a second pumping source (124, fig. 23) with a second optical branch (the coupler that is connected to fiber 121); a first optical coupler (22, fig. 23) connected to the first optical amplifier (123, fig. 23), a second optical coupler (the coupler 30 that is connected to fiber122) inserted between the first (123, fig. 23) and second optical amplifiers (121, fig. 23) and a first control circuit (127, fig. 23) for outputting first and second control signals (col. 18, lines 37-41). Sugaya differs from the claimed invention in that Sugaya does not specifically disclose switching a gain of the first and second amplifiers. Sugaya discloses a control circuit (127, fig. 23) for controlling the light intensity of the excitation light generated by light sources (125, 126, fig. 23) based on a detected optical level (col. 7 lines 9-24, col. 18, lines 37-41). It would have been obvious that a controller such as controller 127 can increase or decrease the intensity of light generated by such light sources and therefore, the gain of respective optical amplifiers corresponding to each light

source can be increased or decreased, and accordingly the gain can be switched. Note that "gain switching" in the present application is defined by pumping or not pumping the light to the respective optical amplifiers 11 and 12, and Sugaya clearly discloses such controllably pumping of light to respective amplifiers 122 and 123. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to incorporate a controller such as the one of Sugaya for gain switching of respective amplifiers to obtain an equal gain and equal output level for each wavelength to provide an amplification system with a constant optical output level.

Regarding claim 2, Sugaya further discloses semiconductor optical amplifier (col. 20, lines 5-27).

Regarding claim 3, Sugaya further discloses optical fiber amplifier (col. 18, lines 16-27).

Regarding claim 6, Sugaya further discloses an optical power monitor (col. 16, lines 32-41 and 112, 113, fig. 23).

Regarding claim 16, Sugaya further discloses a forward-pumped optical fiber amplifier (col. 7, lines 9-28).

Regarding claim 18, Sugaya further discloses the pumping light generated by wavelength division multiplexing (col. 16, lines 32-58, 64-67, col. 17, lines 1-45 and 114, figs. 20, 22 and 127, fig. 23).

Regarding claims 23, Sugaya further discloses a signal light detector (113, fig. 23) for detecting if the signal light is inputted to the first amplifier (col. 16, lines 32-50) and a control circuit (127, fig. 23). Sugaya further differs from the claimed invention in that Sugaya does not specifically discloses shutting down the first and second amplifiers. Sugaya discloses a control circuit 127 for controlling the light intensity of the excitation of light sources 124 and 126 based

on the detected signal level (col. 18, lines 37-41). Therefore, it would have been obvious to an artisan at the time of invention that a controller such as controller 127 can decrease the intensity of light generated by such light sources to such a low level so that no output signal light is generated and thereby shutting down the amplification in order to minimize the risk of self-oscillation of the amplifier itself and to provide a safe level output power for light signals to prevent damages. Furthermore, turning off the fiber amplifier by not exciting the light sources can turn the fiber amplifier into an optical attenuator to further prevent the transmission of light.

Regarding claim 25, Sugaya further discloses a plurality of nodes (50, 20, fig. 12) that are connected through an optical fiber line and having optical line amplifiers (54, 21, fig. 12).

Regarding claim 26, Sugaya differs from the claimed invention in that Sugaya does not specifically disclose first optical amplifier switches the route of light. Sugaya discloses a control unit 127 that control the amount of excitation of light source 126. If light source 126 is not pumped, the optical signals are attenuated by fiber 123 and no signal can be outputted and the transmission of light can be blocked or switched. Therefore, it would have been obvious to an artisan at the time of invention that an optical amplifier and control circuitry such as the one of Sugaya can switch the route of light signals to provide an amplification system that can respond to changes in input or output conditions, or operating conditions such as link loss, pump deterioration, and gain requirements.

Regarding claim 32, Sugaya further discloses the second coupler (the coupler 30 that is connected to fiber 122) is for receiving input light to increase a power of the input signal (the input light is amplified by optical amplifier 121 and further received by coupler 30 and amplified by amplifier 122).

Regarding claims 36-41, as it is understood in view of above 112 problem, Sugaya teaches inputting a first optical signal (the input signal light) to a first erbium-doped fiber (121, fig. 23); inputting a second optical signal (the output light of light source 124) to the first erbium-doped fiber (121, fig. 23) from a first optical pump source (124, fig. 23); selectively (127, fig. 23) inputting a second optical signal (the output light from source 125) to a second erbium-doped fiber (122, fig. 23) from a second pumping source (125, fig. 23); outputting the optical signal from the second erbium-doped fiber (the light is outputted by fiber 122); and controlling a control circuit (127, fig. 23) to selectively input an optical signal to the second erbium-doped fiber instead of the inputting the second optical signal to the first erbium-doped fiber (controller 127 can control the light intensity of light sources 124 and 125, for example light source 125 can be excited and therefore, the second erbium-doped fiber provides the amplification).

6. Claims 4, 12, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugaya (US patent No: 5,812,710) in view of Luo et al. (US Patent No: 6,008,932).

Regarding claims 4 and 12, Sugaya differs from the claimed invention in that Sugaya does not disclose the optical amplifying unit further includes a first, a second, and a third isolator. Luo discloses an optical amplifying section (202, fig. 2) that is comprised of a plurality of optical isolators (210, 218, 226, fig. 2), and a multi-stage EDF amplifiers (212, 224, fig. 2). Therefore, it would have been obvious to an artisan at the time of invention to incorporate optical isolators that are connected to optical amplifiers such as the ones of Luo for the optical amplifying unit of Sugaya in order to block the backward scattering of light. Furthermore connecting optical fiber isolators between multiple fiber amplifiers is conventionally known.

Regarding claim 15, Sugaya differs from the claimed invention in that Sugaya does not specifically disclose the pumping source generates a light of 980 nm wavelength. Luo further discloses a pumping source that generates a light of 980 nm wavelength for pumping the doped fiber (col. 4, lines 9-12). Therefore, it would have been obvious to a person of ordinary skill in the at the time of invention to incorporate a pump source of 980 nm wavelength such as the one of Luo for the pump source in the optical amplifying unit of Sugaya in order to provide a better gain behavior and a low noise figure for signals in the low band region to improve the transmission quality and to further provide compatibility with existing amplifier components technology.

7. Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugaya (US patent No: 5,812,710) in view of Terahara (US Patent No: 6,097,535).

Regarding claims 13-14, Sugaya differs from the claimed invention in that Sugaya does not disclose a first and second filter. Terahara discloses optical amplifiers (32, fig. 6) and optical filters (36, 38, fig. 6) between the optical amplifier (col. 4, lines 21-32). Therefore, it would have been obvious to an artisan at the time of invention to incorporate optical filters that are connected to optical amplifiers such as the ones of Terahara for the optical amplifiers in the optical amplifying unit of Sugaya in order to cancel the wavelength dependence of gain and to reduce deviation in signal-to-noise ratio and deviation in signal power of light signal with respect to wavelength.

8. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sugaya (US patent No: 5,812,710) in view of Tsuda et al. (US Patent No: 6,038,063).

Regarding claim 17, Sugaya differs from the claimed invention in that Sugaya does not disclose one of the optical amplifiers comprises a bidirectional-pumped optical fiber amplifier. Tsuda discloses a bidirectional-pumped optical fiber amplifier (col. 5, lines 11-21 and 44, 48, 48', fig. 3). Therefore, it would have been obvious to a person of ordinary skill in the at the time of invention to incorporate a bidirectionally pumped optical fiber amplifier such as the one of Tsuda for one of the optical amplifiers in the optical amplifying unit of Sugaya in order to further increase the output power of the signal light and to improve the signal to noise ratio.

9. Claims 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugaya (US patent No: 5,812,710) in view of Kinoshita (US Patent No: 6,342,965).

Regarding claims 18-19, Sugaya differs from the claimed invention in that Sugaya does not disclose one of the optical amplifier has a pump light that is generated by a polarization multiplexing, or wavelength division multiplexing. Kinoshita discloses an optical amplifier (61, fig. 6) that has a pump light (63, fig. 6) which is generated by a polarization multiplexing (col. 21, lines 47-50). Therefore, it would have been obvious to a person of ordinary skill in the at the time of invention to incorporate an optical amplifier and a pump light generated by a polarization multiplexing such as the one of Kinoshita for one the optical amplifiers in the optical amplifying unit of Sugaya in order to increase the pump power launched into the fiber and to further reduce unstability of gain due to polarization dependency.

10. Claims 7-8 and 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. Claims 20, 24, 27, and 33 are allowed over prior art of record.

12. Applicant's arguments filed 04/7/2003 have been fully considered but they are not persuasive.

Remark states Sugaya does not teach switching the gain of first and second amplifiers. Sugaya teaches the optical gain of an erbium doped fiber amplifier depends on the excitation ratio, and the excitation ratio depends on the intensity of excitation light generated by a light source, or a pump (col. 7, lines 9-24). Sugaya further teaches by individually controlling the excitation light input to each erbium-doped fiber amplifier, the gain can be controlled (col. 18, lines 16-21). The "gain switching" in the present application is defined by pumping or not pumping the light to the respective optical amplifiers 11 and 12, and Sugaya clearly discloses such controllably pumping of light to respective amplifiers 121, 122 and 123. Therefore, by selectively controlling the excitation of a light source (for example by increasing or decreasing the light intensity) the gain of an optical amplifier can be changed, or it can be switched. As to shutting down the first and second amplifiers, the control circuit 127 can decrease the intensity of light generated by light sources to such a low level so that no output light can be generated and therefore, the amplifications can be shut down. As to first and seconds optical couplers, Sugaya teaches a plurality of optical couplers 30 and an optical splitter 22 that are connected to the amplifiers. Claim 1 recites the first and second optical couplers that are connected to first and

second optical amplifiers. Optical couplers 30 are connected to amplifiers and splitter 20 can couple the light to the other coupler 111. Applicant's attention is directed that during the prosecution of a pending patent application the terms found in the claims should be given the broadest reasonable interpretation, *See In re Pearson,* 181 USPQ 641 (CCPA 1974).

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. R. Sedighian whose telephone number is (703) 308-9063. The examiner can normally be reached on M-F (from 9 AM to 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (703) 305-4729. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4700.

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